Remarks

Applicants submit the following amendment to provide allowable subject matter or place the claims in better form for appeal.

All independent claims have fiber cross-over point and fiber protrusion limitations. Applicants Fig. 4 relates to these limitations.

Claims 1-16 have been cancelled to simplify prosecution. Emphasis has been placed on claims specifically directed to aluminum reduction cell inert anode refractory supports and their use in an electrolytic process.

Claims 17-23 remain in prosecution.

Rejections Under 35 U.S.C. 103

Claims 17-23 remain pending. All claims except Claim 20, which relates to phosphorous oxide coatings on the fibers, are rejected as obvious in view of Applicants' admission of prior art in view of "Permatech Beta 2HPSL with Stainless Steel Fibers" (hereinafter "Permatech Beta 2HPSL/SS") and "Refractories". Claim 20 is rejected further in view of Cheyrezy et al. '867.

Fig. 1 shows the refractory support 12 of inert anode system 10 operating in an electrolytic reduction cell shown in Fig. 2 of this invention where metal fibers 40 are contained within the refractory support 12, where fibers have cross over points 42. Some fibers 40 pass through the exterior side wall 24 as at points 46 and are subject to chemical corrosive attack by a variety of gases from the bath and anode which can start degradation at point 46 and continue through the refractory matrix 48 to various cross over points 50 and continue corrosive effects to, for example, point 52 deep in the refractory matrix. On the very rare occasion that thermal shock might start a crack 56, and cause the crack to propagate as shown at 58, use of fibers 60 will help stop the effect and maintain the integrity of the support, as shown at the top of Fig. 2.

Fig. 4 shows a 1 sq. cm. idealized, magnified view of the exposed side 24 of the castable refractory support 12, showing fiber protrusion at for example point 46. As shown in Fig. 4, seven fibers are shown protruding through the exposed side for possible contact with harmful gases in an aluminum smelting environment. Preferably there are only up to 10 fiber protrusions per sq. cm., on average.

In Example 1, 5 to 10 fibers per sq. cm were found to protrude with excellent results. Applicants have determined and claimed the effective amount of metal fibers to use within the refractory coupled with the maximum allowable fiber protrusions to provide superior results in terms of a combination of resistance to chemical corrosive attack and thermal shock, specific to the use in a molten salt bath of an electrolysis apparatus. Applicants have determined the specific parameters of wt.% metal fibers, length of the fibers, thickness ratio of the fibers and maximum amount of fiber protrusion, to allow use in a specific electrolysis process and method to allow crack resistance in the support and provide minimal fiber degradation. These limitations are important, and as the court stated in In re Boe and Duke, 184 U.S.P.Q. 38,40 (1974 C.C.P.A.):

"This court has stated that all limitations must be considered and that it is error to ignore specific limitations distinguishing over the references. In re Saether, 181 U.S.P.Q. 36,39 (1974 C.C.P.A.); In re Glass, 176 U.S.P.Q. 489,491 (1973 C.C.P.A.)."

Also, case law dictates that in proceeding from the prior art to the invention claims, one cannot base obviousness of what a person skilled in the art would have led a person to do, as stated in In re Tomlinson, Hall and Geigle, 150 U.S.P.Q. 623,626 (C.C.P.A 1966):

"Our reply to this view is simply that it begs the question; which is obviousness under section 103 of compositions and methods, not of the direction to be taken in making efforts or attempts. Slight reflection suggests, we think that there is usually an element of 'obviousness to try' in any research endeavor, that it is not undertaken with complete blindness but rather

with some semblance of a change of success, and that patentability determinations based on that as a test would not only be marked deterioration of the entire patent systems as an incentive to invest in those efforts and attempts which go by the name of 'research'."
And also affirmed in The Gilette Co. v. S.C. Johnson and Son, Inc., 16 USPQ 2d 1923, 1928 (Fed.Cir. 1990). Also, as stated by the court in In re Regal, 18 U.S.P.Q. 136, 139 (C.C.P.A. 1975):

"As we have stated in the past, there must be some logical reason apparent from positive, concrete evidence of record which justifies a combination of primary and secondary references. In re Stemniski, 170 USPQ 343 (CCPA 1971). Further, as we stated in In re Bergel, 130 USPQ 206 (CCPA 1961); 'The mere fact that it is possible to find two isolated disclosures which might be considered in such a way to produce a new compound does not necessarily render such production obvious unless the art also contains something to suggest desirability of the proposed combination'."
And also affirmed in In re Gergen, 1 USPQ 2d 1652, 1653 (Fed. Cir. 1989), and Symbol Technologies Inc. v. Opticon Inc., 19 USPQ 2d 1241, 1246 (Fed. Cir. 1991).

Again, as presented previously, applicants see no discussion in either Permatech Beta 2 HPSL/SS nor Refractories that would teach or specifically suggest the limitation to about <20 fiber protrusions per sq. cm. on average. The specification points out the importance of these limits. Applicants respectfully submit that neither admitted prior art, Permatech Beta 2HPSL/SS nor Refractories, taken either alone or in combination, teach or make obvious to one skilled in the art at the time the invention was made, the invention of amended claims 17-19 and 21-23.

Claim 20 is subject to the same rejection but further in view of Cheyrezy et al. '867, which relates to concrete. While Cheyrezy et al, describes many ways to increase fiber roughness, and controlling fiber/matrix bonding by etching, silica deposition and/or metal

phosphate deposition, it adds nothing to the teachings that Permatech Beta 2HPSL/ss and Refractories lack to make the independent claims 17 and 23 obvious. Applicants respectfully submit that neither admitted prior art, Permatech Beta 2HPSL/ss, Refractories nor Cheyrezy et al. '867 taken either alone or in combination or with Dean Jr. U.S. 5,080,325 (not specifically cited) or Bozer et al. U.S. 3,927,139 (not specifically cited), teach or make obvious to one skilled in the art at the time the invention was made, the invention of amended claims 17-23. While applicants have emphasized certain limitations, those limits in combination with others in the amended claims add a combined effect to provide a unique support for use, specifically as claimed in molten salt bath/electrolysis systems.

"Permatech Beta 2HPSL" and "Refractories"' seem to relate to material for furnaces for alloying aluminum with other metals, offering molten-metal resistance and molten aluminum alloy resistance, whereas applicant's claims relate to resistance to molten cryolite salt bath and gases such as HF and 0_2; and Cheyrezy et al. relates to concrete. Also, there is absolutely no teaching in any cited art as to the acceptable range of fibers/sq. in. protruding through the support even if considered in view of Dean, Jr. and Bozer et al. which only relate to an 'obvious to try' situation (see In re Tomlinson, Hall and Geigle quoted previously)

Summary

All outstanding issues are believed to have been addressed. In view of the foregoing amendments and arguments, applicants respectfully request entry of the amendment and submit that all pending claims, Claims 17-23 are in condition for allowance; and Applicants respectfully request reconsideration and allowance of those claims. Recognizing we are under Final Rejection, any suggestion by the Examiner as to deletion or modification of language to present allowable subject matter would be appreciated.

Respectfully submitted,

Daniel P. Cillo

Daniel P. Cillo
Registration No. 25,108
Eckert Seamans Cherin & Mellott, LLC
Alcoa Technical Center
100 Technical Drive
Alcoa Center, PA 15069
Attorney for Applicants
Telephone: (724) 337-2778